

CLAIMS

We claim:

1. A method for delivering a stent into a body lumen, said method comprising the steps of:
 - 5 (1) providing a stent delivery device comprising an outer tube having a proximal end and a distal end and sized to hold said stent therein in a radially constricted condition, an inner tube within said outer tube having a proximal end and a distal end, and a balloon fixedly mounted on said inner tube and positioned within said outer tube;
 - 10 (2) positioning said stent in a radially constricted state within said outer tube in a longitudinal position so that at least a portion of said stent is longitudinally contiguous with at least a portion of said balloon;
 - 15 (3) inflating said balloon so as to trap said stent between said balloon and said outer tube;
 - (4) guiding said delivery device within said body lumen to position said stent within said delivery device to a position within said body lumen; and
 - (5) moving said outer tube proximally relative to said inner tube, said balloon and said stent so as to at least partially release said stent from said outer tube.
- 20 2. The method of claim 1 further comprising the step of:
 - (6) moving said outer tube distally relative to said inner tube, said balloon and said stent so as to at least partially recapture said stent within said outer tube.

3. The method of claim 1 wherein step (3) is performed before step (4) and after step (2).

4. The method of claim 1 wherein step (4) is performed before step (3).

5. The method of claim 1 wherein step (3) is performed as part of the process of manufacturing said stent delivery device.

6. The method of claim 5, wherein step (2) is performed after step (1).

7. The method of claim 6 wherein step (2) is performed just prior to step (4).

8. The method of claim 1 further comprising the steps of:

(7) deflating said balloon after said stent is fully released from said outer tube;

10 (8) moving said inner tube proximally relative to said outer tube so as to

recapture said deflated balloon in said outer tube.

9. The method of claim 8 further comprising the step of:

(9) withdrawing said stent delivery device from said body lumen.

10. The method of claim 1 wherein said stent is a self-expanding stent.

11. The method of claim 8 wherein said stent is a self-expanding stent.

12. The method of claim 9 wherein said stent is a self-expanding stent.

13. The method of claim 1 wherein step (3) comprises inflating said balloon sufficiently to hold said stent stationary relative to said outer tube when said outer tube is moved longitudinally relative to said inner tube.

* 14. The method of claim 1 wherein said balloon is shorter than said stent and wherein step (2) comprises positioning at least a portion of said stent longitudinally aligned with said balloon.

15. The method of claim 1 wherein said balloon is shorter than said stent, said stent having a proximal end and a distal end and wherein step (2) comprises positioning said stent so that said balloon is adjacent said proximal end of said stent.

16. The method of claim 15 wherein said balloon comprises first and second balloons and wherein step (2) comprises positioning said stent so that said first balloon is close to said proximal end of said stent and said second balloon is close to said distal end of said stent.

17. The method of claim 1 wherein step (3) comprises inflating said balloon through said inner tube.

18. The method of claim 1 wherein step (1) comprises providing an inflation tube within said outer tube separate from said inner tube and wherein step (3) comprises introducing a fluid into said balloon via said inflation tube.

19. An apparatus for delivering a self expanding stent into a body lumen comprising:

an outer tube having a proximal end and a distal end and sized to hold a self-expanding stent therein in a radially constricted condition;

an inner tube within said outer tube having a proximal end and a distal end;

a stent in a radially constricted state within said outer tube; and

an inflated and permanently sealed balloon fixedly mounted on said inner tube and positioned within said outer tube so that at least a portion of said stent is longitudinally contiguous with at least a portion of said balloon and presses said stent against said outer tube, said balloon being more compliant than said outer tube, whereby said stent has a greater resistance to longitudinal motion relative to said balloon than to longitudinal motion relative to said outer tube.

20. The apparatus of claim 19 wherein said balloon is formed of polyurethane.

21. The apparatus of claim 19 wherein said balloon is formed of silicone.

22. The apparatus of claim 19 wherein said stent is a self-expanding stent.

23. The apparatus of claim 19 wherein said balloon is inflated sufficiently to
5 hold said stent stationary relative to said outer tube when said inner tube is moved
longitudinally relative to said inner tube.

24. The apparatus of claim 19 wherein said balloon has a length about equal
to a length of said stent and wherein said stent is longitudinally aligned with said
balloon.

10 25. The apparatus of claim 19 wherein said balloon is shorter than said stent,
said stent having a proximal end and a distal end and wherein said stent is positioned
so that said balloon is adjacent said proximal end of said stent.

26. The apparatus of claim 19 wherein said balloon comprises first and
second balloons and wherein said stent is positioned so that said first balloon is
15 adjacent said proximal end of said stent and said second balloon is adjacent said distal
end of said stent.